

## REMARKS

This is responsive to the Final Office Action that was mailed July 13, 2007 (hereinafter "Office Action").

### Claim Amendments

Claim 34 has been canceled without prejudice.

### Claim Rejections Under 35 U.S.C. §103(a)

Claims 1, 3-15, 18-23, 26, 27, 29-36, 39, 43, and 46-54 are rejected under 35 U.S.C. §103(a) as being unpatentable over Pittman et al. (U.S. 5,998,968)("Pittman") in view of Uribe et al. (US 6,635,369)("Uribe") and further in view of Iino et al. (U.S. Patent No. 6,313,637)("Iino").

Applicant's previous arguments in response to this rejection are hereby incorporated by reference.

With respect to amended claim 1, and the claims which depend from amended claim 1, amended claim 1 discloses a fuel cell maintenance device that comprises a switch, a pulse generator capable of pulsing a cathode of at least one cell of a fuel cell stack through the switch when the switch is closed, a relay capable of shorting the cell of a fuel cell stack, and a dielectrically isolated driver capable of driving the relay. Further, amended claim 1 specifies that the pulse generator generates a digital pulse. Applicant maintains that all of these features are neither taught nor suggested by the disclosures of Pittman, Uribe, and Iino when considered individually or in combination with one another.

First, Pittman discloses a number of transistors in a battery charging electric circuitry, including a MOSFET transistor Q3 (FIG. 1). However, Pittman does not teach or suggest how to design a unique switch to short a cell or cells in a fuel cell stack as disclosed by the present invention. As one of skill in the art will appreciate, shorting a cell or cells in a fuel cell stack requires a substantial understanding of fuel cell theory.

Second, Uribe mentions the concept of pulsing a fuel cell cathode to improving fuel cell performance; however, Uribe does not teach or suggest a

circuitry to pulse the cathode of a cell or cells in a fuel cell stack as disclosed by the present invention. As one of skill in the art will appreciate the circuitry to pulse the cathode of a cell or cells in a fuel cell stack requires substantial understanding of the circuitry theory.

Third, lino discloses a dielectrically isolated driver for a battery pack voltage detecting device; however, lino does not teach or suggest a unique switch for a fuel cell stack as disclosed by the present invention.

One of ordinary skill in the art can appreciate that fundamentally that all electrical circuitries are formed from basic elements, e.g., transistor Q3 in Pittman's circuitry, dielectrically isolated driver 20a in lino's circuitry. However, in order to render the present invention obvious, the prior art elements must be combined according to known methods to yield predictable results. MPEP 2141. In this case, as described in detail above, the prior art elements are not combined according to known methods to yield predictable results. Instead, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. This is not a case of "the predictable use of prior art elements according to their established functions." MPEP 2100-116, E8R6. In the present invention, basic elements such as a switch, a pulse generator, and a dielectrically isolated driver are combined in a unique and creative manner to comprise a fuel cell maintenance device. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and lino). MPEP 2141.

In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re* Glaug, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and lino without using the explanation of the present invention. Pittman, lino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142.

In summary, Pittman, Uribe, or lino alone or in combination do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claim 1, and the claims which depend from amended claim 1, is not unpatentable over Pittman in view of Uribe and lino.

Reconsideration and withdrawal of the rejection of claim 1, and the claims which depend from claim 1, under §103(a) is respectfully requested.

With respect to claim 5, and the claims which depend from claim 5, Pittman, Uribe, and lino do not teach or suggest the art of the design of a device to maintain a fuel cell stack with multiple cells. Applicant respectfully disagrees that one of ordinary skill in the art would take part of Pittman's circuitry, integrate it with lino's circuitry seamlessly, then apply Uribe's cathode pulsing disclosure on a fuel cell stack. Office Action, p. 3. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and lino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re Glaug*, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and lino without using the explanation of the present invention.

With respect to claim 8, and the claims which depend from claim 8, Pittman does not teach or suggest a switch or a pulse generator capable of receiving power return from the fuel cell stack (Col. 11, lines 29-31). In contrast, Pittman contains no mention of power return and a fuel cell stack.

With respect to claim 9, as acknowledged by the Examiner (Office Action, p. 4), neither Pittman nor Uribe teach a voltage regulator to receive power return from a fuel cell stack. In addition, lino does not contain any teaching related to a fuel cell. Therefore, absent the explanation of the present invention, one of ordinary skill in the art would not have combined Pittman, Uribe, and lino.

With respect to claim 10, as discussed above, one of ordinary skill in the art would not have taken a piece of Pittman's circuitry, integrated it with lino's circuitry seamlessly, and then applied Uribe's cathode pulsing disclosure on a fuel cell stack. Further, Pittman, Uribe, and lino do not teach a pulse generator capable of pulsing a cathode when the switch is closed.

With respect to claim 11, and the claims which depend from claim 11, as discussed above, Pittman, Uribe, and lino do not teach or suggest the art of the

design of a device to maintain a fuel cell stack with multiple cells. Applicant respectfully disagrees that one of ordinary skill in the art would take part of Pittman's circuitry, integrate it with lino's circuitry seamlessly, then apply Uribe's cathode pulsing disclosure on a fuel cell stack. Office Action, p. 5. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and lino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re Glaug*, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and lino without using the explanation of the present invention. Pittman, lino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142. In summary, Pittman, Uribe, or lino alone or in combination do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claim 11, and the claims which depend from amended claim 11, is not unpatentable over Pittman in view of Uribe and lino. Reconsideration and withdrawal of the rejection of claim 11, and the claims which depend from claim 11, under §103(a) is respectfully requested.

With respect to claim 14, and the claims which depend from claim 14, Pittman, Uribe, and lino do not teach or suggest a fuel cell maintenance device as in the present invention. Pittman, Uribe, and lino do not disclose a second relay capable of shorting at least a second cell of a fuel cell stack. Pittman, Uribe, and lino do not disclose a second dielectrically isolated driver capable of driving second relay responsive to the pulse generator output. Pittman, Uribe, and lino do not disclose a control circuit of controlling such a pulse generator as disclosed in the present invention.

With respect to claim 18, Pittman, Uribe, and lino do not teach or suggest a fuel cell maintenance device as in the present invention. Pittman does not teach or suggest a pulse generator capable of pulsing a cathode of second cell of a fuel cell stack and lino does not teach or suggest a dielectrically isolated driver to close a relay to short a cell in a fuel cell stack.

With respect to claim 19, and the claims which depend from claim 19, as discussed above, Pittman, Uribe, and lino do not teach or suggest the art of the design of a device to maintain a fuel cell stack with multiple cells. Applicant respectfully disagrees that one of ordinary skill in the art would take part of Pittman's circuitry, integrate it with lino's circuitry seamlessly, then apply Uribe's cathode pulsing disclosure on a fuel cell stack. Office Action, p. 9. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and lino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re Glaug*, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and lino without using the explanation of the present invention. Pittman, lino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142. In summary, Pittman, Uribe, or lino alone or in combination do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claim 19, and the claims which depend from amended claim 19, is not unpatentable over Pittman in view of Uribe and lino. Reconsideration and withdrawal of the rejection of claim 19, and the claims which depend from claim 19, under §103(a) is respectfully requested.

With respect to claim 21, Pittman does not teach or suggest a fuel cell maintenance device as in the present invention. Pittman does not teach or suggest a relay in parallel across a second cell of a fuel cell stack in Figure 1 as cited by the Examiner. Office Action, p. 8.

With respect to claim 22, and the claims which depend from claim 22, Pittman, Uribe, and lino do not teach or suggest a fuel cell maintenance device as in the present invention. Pittman, Uribe, and lino do not disclose a second relay capable of shorting at least a second cell of a fuel cell stack. Pittman, Uribe, and lino do not disclose a second dielectrically isolated driver capable of driving second relay responsive to the pulse generator output. Pittman, Uribe, and lino do not disclose a

control circuit of controlling such a pulse generator as disclosed in the present invention.

With respect to claim 26, Pittman, Uribe, and Iino do not teach or suggest a fuel cell maintenance device as in the present invention. Pittman does not teach or suggest a relay electrically connected in parallel across a second cell in a fuel cell stack. Further, Pittman does not teach or suggest a pulse generator capable of pulsing a cathode of second cell of a fuel cell stack. In addition, Iino does not teach or suggest a dielectrically isolated driver to close a relay to short a cell in a fuel cell stack. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory.

With respect to claim 27, and the claims which depend from claim 27, as discussed above, Pittman, Uribe, and Iino do not teach or suggest a fuel cell maintenance device as in the present invention. The Examiner refers to a single element (Figure 1 element Q3) and a single control circuit (Figure 1 element 17) in Pittman's circuitry which was designed for a single battery. Office Action, p. 9. One of ordinary skill in the art would not have predicted a complex network with this incomplete raw element design. In addition, one of ordinary skill in the art would not have then applied the network to another application such as Uribe. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and Iino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re* Glaug, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and Iino without using the explanation of the present invention. Pittman, Iino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142. In summary, Pittman, Uribe, or Iino alone or in combination do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claim 27, and the claims which depend from

amended claim 27, is not unpatentable over Pittman in view of Uribe and Iino. Reconsideration and withdrawal of the rejection of claim 27, and the claims which depend from claim 27, under §103(a) is respectfully requested.

With respect to claim 32, and the claims which depend from claim 32, Pittman does not teach or suggest a switch or a pulse generator capable of receiving power return from the fuel cell stack (Col. 11, lines 29-31). In contrast, Pittman contains no mention of power return and a fuel cell stack.

With respect to claim 33, as acknowledged by the Examiner (Office Action, p. 4), neither Pittman nor Uribe teach a voltage regulator to receive power return from a fuel cell stack. In addition, Iino does not contain any teaching related to a fuel cell. Therefore, absent the explanation of the present invention, one of ordinary skill in the art would not have combined Pittman, Uribe, and Iino.

With respect to claim 35, Iino discloses a micro-processor based control circuit. One of ordinary skill in the art will appreciate that a micro-processor based control circuit is fundamentally different than the pulse generator/counter/multiplexer design of the present invention.

With respect to claims 36 and 39, as discussed above, Pittman, Uribe, and Iino do not teach or suggest the art of the design of a device to maintain a fuel cell stack with multiple cells. Applicant respectfully disagrees that one of ordinary skill in the art would take part of Pittman's circuitry, integrate it with Iino's circuitry seamlessly, then apply Uribe's cathode pulsing disclosure on a fuel cell stack. Office Action, p. 11. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and Iino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re Glaug*, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and Iino without using the explanation of the present invention. Pittman, Iino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142. In summary, Pittman, Uribe, or Iino alone or in combination

do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claims 36 and 39 are not unpatentable over Pittman in view of Uribe and Iino. Reconsideration and withdrawal of the rejection of claims 36 and 39 under §103(a) is respectfully requested.

With respect to claim 43, and the claims which depend from claim 43, as discussed above, Pittman, Uribe, and Iino do not teach or suggest the art of the design of a device to maintain a fuel cell stack with multiple cells. Applicant respectfully disagrees that one of ordinary skill in the art would take part of Pittman's circuitry, integrate it with Iino's circuitry seamlessly, then apply Uribe's cathode pulsing disclosure on a fuel cell stack. Office Action, p. 11. As discussed above, the present invention requires multi-disciplinary knowledge bases including a substantial understanding of fuel cell theory and a substantial understanding of circuitry theory. One of ordinary skill in the art would not have predicted the present invention based on the prior art (Pittman, Uribe, and Iino). MPEP 2141. In addition, the present invention's explanation of the fuel cell maintenance device cannot be used to render the present invention obvious. *In re Glaug*, 283 F.3d 1335, 62 U.S.P.Q.2d 1151 (Fed. Cir. 2002). One of ordinary skill in the art would not have arrived at the combination of Pittman, Uribe, and Iino without using the explanation of the present invention. Pittman, Iino, and Uribe do not teach or suggest how to design the present invention. Impermissible hindsight must be avoided. MPEP 2142. In summary, Pittman, Uribe, or Iino alone or in combination do not teach or suggest how to design a fuel cell maintenance device as disclosed by the present invention. As a result, amended claim 43, and the claims which depend from amended claim 43, is not unpatentable over Pittman in view of Uribe and Iino. Reconsideration and withdrawal of the rejection of claim 43, and the claims which depend from claim 43, under §103(a) is respectfully requested.

With respect to claim 53, Pittman does not teach or suggest a switch or a pulse generator capable of receiving power return from the fuel cell stack (Col. 11, lines 29-31). In contrast, Pittman contains no mention of power return and a fuel cell stack.

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All of the stated grounds of objection and rejection are believed to have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding objections and rejections and that they be withdrawn. Applicant believes that a full and complete response has been made to the outstanding Office Action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

Prompt and favorable consideration of this Amendment is respectfully requested.

Respectfully submitted,



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